means for focusing an optical beam disposed along a path of said collimating means; and

means for refracting an optical beam into at least two components having orthogonal polarization components, said refracting means optically coupled with said first, said second, and said third optical axis defining means with an angle to said first optical axis to reduce an optical reflection.

34. (Amended) The optical polarization beam splitter of claim 33 wherein said refracting means is oriented at a non-normal angle to said first optical axis.

35. (Amended) The optical polarization beam splitter of claim 33 wherein said second and third optical axis defining means are polarization maintaining fibers.

36. (Amended) The optical polarization beam splitter of claim 33 wherein said second optical axis and said third optical axis are spaced apart by a distance of less than 2 mm.

37. (Amended) The optical polarization beam splitter of claim 33 disposed in a package having a length of less than about 50mm and a diameter of less than about 10 mm.

REMARKS

This amendment is responsive to the Office Action dated April 9, 2002.

Claims 2 and 22-37 have been amended. Claims 2-6 and 22-37 are pending.

Attached is a marked-up version of the changes being made by the current amendment.

In view of the above amendments and the following remarks, the applicant requests favorable reconsideration and allowance of the application.

Applicant's remarks, below, are preceded by quotations of the related comments of the examiner, in small, bold-face type.

Claim Rejections- 35 USC §103

1. Claims 2-6 and 22-37 are rejected under 35 U. S. C. §103(a) as being unpatentable over Cheng (U. S. 6,014,256).

The Cheng patent teaches, in Figure 3a, all of the claimed elements EXCEPT FOR the use of two lenses (a collimating and focusing lens), the use of polarization maintaining fibers and the specific size ranges of the device. As seen, there is a first fiber (I6c) defining a first axis, a second fiber (I6a) defining a second axis, and a third fiber (16b) defining a third axis which is parallel to and spaced apart from the second axis. There is also a focusing lens (32)and a birefringent walk-off crystal (30) which has a first face adjacent to the lens and a second face in contact with the second and third fibers and at the focal point of he focusing lens. In terms of the fibers, it is believed at least obvious, if not inherent, that the Cheng device uses polarization maintaining fibers, since said device is used as a polarization beam splitter, which necessitates the exiting fibers (I6a, I6b) maintaining the polarization states of the exiting beams.

Claims 2, 22, 27 and 33 have been amended to recite that the birefringent crystal or refracting means is oriented at an angle to the first optical axis. Support for this amendment is found in the specification at page 11 lines 4-7 and in Fig. 3. No new matter has been added.

The Cheng reference neither discloses or suggests, in Fig. 3a, that the birefringent crystal 30 is oriented at an angle to the first optical axis. Indeed, Cheng teaches away from orienting the birefringent at an angle to the first optical axis by illustrating, in Fig. 3a, the crystal 30 parallel to the first optical axis of first fiber 16c.

Therefore, Applicants submit that the subject matter of 2, 22, 27 and 33 would have been not obvious. Withdrawal of the rejections is requested. Dependent claims 3-7, 23-26, 28-32 and 34-37 also are not obvious for at least the same reasons.

As to the sizes, column 3. line 55 describes the crystal (30) of Fig. 3a as being 1/50th the size of the conventional splitter/combiner device. It is believed that this value, while not specifically given in Cheng, is inherently within those value ranges set forth in Applicants' claims 4-6, 24-26, 31-32, and 36-37.

Applicants submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

The sizes of the birefringent crystal recited in claims 4-6, 24-26, 31, 32, 36 and 37 of the present disclosure are neither obvious or inherent from the Cheng reference said sizes not being specified nor determinable from the disclosure therein.

As for the use of two lenses, one for collimating and one for focusing, it would have been obvious to one having ordinary skill in the art to have used such a two-lens design in place of the single lens (32) of Cheng, for at least the purposes of allowing additional space in which

to effect the correction of alignment errors in said device. Indeed, when producing collimated light from the first fiber (16c), the placement along the optical axis need not be so exact in terms of the focusing lens in order to maintain the position of the focused beams on the second and third fibers.

Applicants respectfully traverse this rejection. The Office action relies on what is presumed to be the level of skill knowledge of one of ordinary skill in the art. Reliance on what is presumed to be the level of knowledge of one of ordinary skill in the art is improper in the absence of a specific teaching or suggestion because skill in the art cannot "act as a bridge over gaps in substantive presentation of an obviousness case . . ." *Al-Site Corp. v. VSI International, Inc.*, 174 F.3d 1308, 50 U.S.P.Q.2d 1161, 1171 (Fed. Cir. 1999). "Deficiencies of the cited references cannot be remedied by general conclusions about what is "basic knowledge or common sense" *In re Lee*, 277 F.3d 1338, 1345 (Fed. Cir. 2002)

Cheng does not teach or suggest using two lenses as recited in the present application. Claims 2, 22, 27 and 33. Cheng teaches away from using two lenses by illustrating and describing the use of a single lens 32. See, for example, col. 3 lines 62-67 and Fig. 3a.

Applicants submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

In view of the above amendment and remarks, the Applicants respectfully request allowance of the application.

Respectfully submitted,

Date: 11/7/07

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Version with markings to show changes made

In the claims:

Claims 2, 22- 37 have been amended as follows:

2. (Twice amended) An optical polarization beam splitter comprising:

a first optical fiber having an end defining a first optical axis;

a second optical fiber having an end defining a second optical axis;

a third optical fiber having an end defining a third optical axis parallel to and spaced apart from said second optical axis;

a collimating lens disposed along said first optical axis positioned to form a collimated optical beam from said first optical fiber;

a [focussing] focusing lens disposed along a path of said collimated optical beam;

a birefringent walk-off crystal having a first face adjacent to said focusing lens, said first face located at a focal plane of said focusing lens with an angle to said first optical axis to reduce an optical reflection, and a second face in contact with said ends of said second and third optical fibers, said crystal oriented such that and having a thickness between said first and second faces selected such that a first component of said optical beam having a first polarization exiting said crystal at said second face enters said end of said second optical fiber along said second optical axis and a second component of said optical beam having a second polarization orthogonal to the polarization of said first polarization exiting said crystal at said second face enters said end of said third optical fiber along said third optical axis.

22. (Amended) An optical polarization beam splitter comprising:

a first optical fiber having an end defining a first optical axis;

a second optical fiber having an end defining a second optical axis;

a third optical fiber having an end defining a third optical axis parallel to and spaced apart from said second optical axis;

a collimating lens disposed along said first optical axis positioned to form a collimated optical beam from said first optical fiber;

a focusing lens disposed along a path of said collimated optical beam;

a birefringent walk-off crystal having a first face adjacent to said focusing lens said first face located at a focal plane of said focusing lens with an angle to said first optical axis to reduce an optical reflection and a second face in contact with said ends of said second and third optical fibers, said crystal oriented such that said first optical axis is not normal to said crystal, said crystal oriented such that and having a thickness between said first and second faces selected such that a first component of said optical beam having a first polarization exiting said birefringent walk-off crystal at said second face enters said end of said second optical fiber along said second optical axis and a second component of said optical beam having a second polarization orthogonal to the polarization of said first polarization exiting said crystal at said second face enters said third optical fiber along said third optical axis.

23. (Amended) The optical polarization beam splitter of claim [7] 22 wherein said second and third optical fibers are polarization maintaining fibers.

24. (Amended) The optical polarization beam splitter of claim [7] 22 wherein said second optical axis and said third optical axis are spaced apart by a distance of less than 2mm.

25. (Amended) The optical polarization beam splitter of claim [7] 22 disposed in a package having a length of less than about 50mm and a diameter of less than about 10mm.

26. (Amended) The optical polarization beam splitter of claim [7] 22 disposed in a package having a length of about 36mm and a diameter of about 5.5mm.

27. (Amended) An optical polarization beam splitter comprising:

a first optical fiber having an end defining a first optical axis;

a second optical fiber having an end defining a second optical axis distinct from said first optical axis;

a third optical fiber having an end defining a third optical axis distinct from both said first and second optical axes, said third axis is parallel to and spaced apart from said second optical

axis;

a collimating lens disposed along said first optical axis positioned to form a collimated optical beam from said first optical fiber;

a focusing lens disposed along a path of said collimated optical beam; and

a birefringent walk-off crystal having a first face adjacent to said focusing lens and located at a focal plane of said focusing lens with an angle to said first optical axis to reduce an optical reflection, and a second face in contact with said ends of said second and third optical fibers.

28. (Amended) The optical polarization beam splitter of claim [12] 27 wherein said birefringent walk-off crystal is oriented at a non-normal angle to said first optical axis.

29. (Amended) The optical polarization beam splitter of claim [12] 27 wherein said birefringent walk-off crystal is oriented such that a first component of said optical beam having a first polarization exiting said birefringent walk-off crystal at said second face enters said end of said second optical fiber along said second optical axis, and a second component of said optical beam having a second polarization orthogonal to the polarization of said first polarization exiting said crystal at said second face enters said third optical fiber along said third optical axis.

30. (Amended) The optical polarization beam splitter of claim [14] 29 wherein said second and third optical fibers are polarization maintaining fibers.

31. (Amended) The optical polarization beam splitter of claim [14] 29 wherein said second optical axis and said third optical axis are spaced apart by a distance of less than 2 mm.

32. (Amended) The optical polarization beam splitter of claim [14] 29 disposed in a package having a length of less than about 50mm and a diameter of less than about 10 mm.

33. (Amended) An optical polarization beam splitter comprising:

means for defining a first optical axis;

means for defining a second optical axis distinct from said first optical axis;

means for defining a third optical axis distinct from both said first and second optical axes, said third axis is parallel to and spaced apart from said second optical axis;

means for collimating an optical beam disposed along said first optical axis positioned to form a collimated optical beam from said first optical axis defining means;

means for focusing an optical beam disposed along a path of said collimating means; and

means for refracting an optical beam into at least two components having orthogonal polarization components, said refracting means optically coupled with said first, said second, and said third optical axis defining means with an angle to said first optical axis to reduce an optical reflection.

34. (Amended) The optical polarization beam splitter of claim [18] 33 wherein said refracting
means is oriented at a non-normal angle to said first optical axis.

35. (Amended) The optical polarization beam splitter of claim [18] 33 wherein said second and third optical axis defining means are polarization maintaining fibers.

36. (Amended) The optical polarization beam splitter of claim [18] 33 wherein said second optical axis and said third optical axis are spaced apart by a distance of less than 2 mm.

37. (Amended) The optical polarization beam splitter of claim [18] 33 disposed in a package having a length of less than about 50mm and a diameter of less than about 10 mm.